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Memorandum

To: Joe Burke, Sevenson Environmental Services, Inc.

From: John Laplante and John Verduin, Anchor Environmental

CC: Carl Stivers, Ed Berschinski and Tim Stone, Anchor Environmental
Bob Wyatt, NW Natural

Date: October 11, 2005

Re: Organoclay Geotextile Installation - Tar Body Removal Action
NW Natural Gasco Site, Portland, Oregon

This memorandum presents design and installation recommendations for an organoclay reactive geotextile mat over certain portions of the exposed dredge prism at the Gasco Site, in Portland, Oregon. Figure 1 presents the project area, with the interim bathymetric survey information dated October 6, 2005. This memorandum updates and supersedes our October 10, 2005 memorandum on the same subject.

1 BACKGROUND

On October 3, 2005 EPA provided NW Natural with a directed design change based on a request from Oregon Department of Environmental Quality (DEQ). The directed design change, in part, stated "DEQ is requesting that organoclay mats be placed along the beach cut prior to placement of the sand cap."

After being notified of the directed design change by EPA, Anchor visited the project site on October 7, 2005 to evaluate the area where the reactive geotextile would be used. The area where the geotextile would be placed is located on the approximately 1H:1V slope face along the shoreline, between elevations +5 and +10, NAVD 88. During Anchor's site visit, the exposed face was observed during river stages that ranged from approximately +6 to +8 feet. Anchor did not observe active seepage of sheen-producing product from the exposed face – however sheen was present floating on the surface of the water in the general vicinity of the dredge work.

EPA specified the use of an organoclay product to cover the exposed dredge slope face. Based on conditions at the site, Anchor believes the easiest way to place the organoclay would be to use a geotextile "reactive" mat, such as the CETCO Organoclay Reactive Core Mat (RCM).

2 INSTALLATION RECOMMENDATIONS

Anchor recommends that the RCM be installed as follows:

1. Place 6 inches of the Pilot Cap or Fringe Cover sand to act as bedding material and to prevent damage to the mat.
2. Place the RCM on the slope face. The edge of the roll should be located at the top of the cut face of the slope, and the RCM should be rolled along the slope face parallel to the flow of the river. Figures 1 and 2 show the placement of the RCM in plan view and section, respectively. The RCM should be temporarily anchored in place until the final quarry spall ballast is placed. All seams should overlap a minimum of 1 foot.
3. Place the an additional 6 inches of the Pilot Cap or Fringe Cover sand on top of the RCM to protect the RCM from the armor layer.
4. Place the 6-inch-thick armor layer on top of the sand on the flat bench. This armor layer is intended to provide protection for the Pilot Cap and RCM in the surf zone, and should consist of 6-inch minus rock with a d_{50} of 3 inches. The lateral extents of this armor layer are presented in Figure 1, and extend across the bench at elevation +5, and terminate at elevation 0.
5. Place a wedge of 8-inch minus quarry spalls into the "notch" at the base of the cut face, as shown in Figure 2. This wedge is intended to permanently anchor the RCM in place.

Note that if the RCM does not arrive to the site on time, the construction sequence above may need to be modified.

3 MATERIALS

The following materials and estimated volumes are needed to complete the work described in this memorandum:

- Organoclay Reactive Core Mat: 170 feet long by 15 feet wide.
- 6-inch minus armor layer: Approximately 75 to 100 cubic yards.

- 8-inch minus quarry spall anchor wedge (e.g. WSDOT 9-13.6): Approximately 40 cubic yards.

Please contact us if you have any questions or comments.

Legend:

- **1.5** Dredge Prism and Dredge Elevation
- **RAA-01** Sample Location and Number (July 2004, Anchor)
- *-33.5* Bottom Elevation of Surface Tar Body in Removal Action Area (ft NAVD 88)
- AN-2-1 Previous Sediment Core Location (Anchor 2001)
- SD063 Previous Sediment Core Location (Weston 1998)
- SD-7 Previous Sediment Core Location (HAI 1996)
- Pile Location (To be removed during dredging)
- Support Pile Locations (to be protected during dredging)
- Property Line
- OHW = 20.41 ft NAVD 88
- OLW = 7.91 ft NAVD 88
- 50% River Stage Elevation = 10.23 ft NAVD 88
- Reactive Core Geotextile Mat (RCM) Location
- Lateral Extents of Surf Zone Armoring d50 = 3 inches

0 50
Scale in Feet

Notes:

1. Bathymetric contours provided by the Lower Willamette Group as part of the Portland Harbor Superfund Site study (2003).
2. Upland topography directed by Anchor Environmental as part of upland investigation (2002)
3. Horizontal Datum: Oregon State Plane North NAD 83 (ft).
4. Vertical Datum: NAVD 88 (ft).
5. Former Drainage Ditch location from Phase 1 Remedial Investigation Summary Report, Hahn & Associates, 1998.

Point	Easting	Northing
0+00	7623791.46	705554.09
3+00	7624051.27	705404.09
A	7623903.50	705620.13
B	7623915.31	705690.73
C	7623931.04	705717.98
D	7623965.95	705778.44
E	7624100.77	705714.57
F	7624059.81	705643.64
G	7624075.04	705634.85
H	7624034.41	705564.48
I	7624019.19	705573.27
J	7624014.81	705565.70
K	7624030.04	705556.90
L	7624025.91	705549.76
M	7624021.54	705542.18
N	7624006.53	705516.18
O	7623985.51	705528.31
P	7623921.57	705599.90

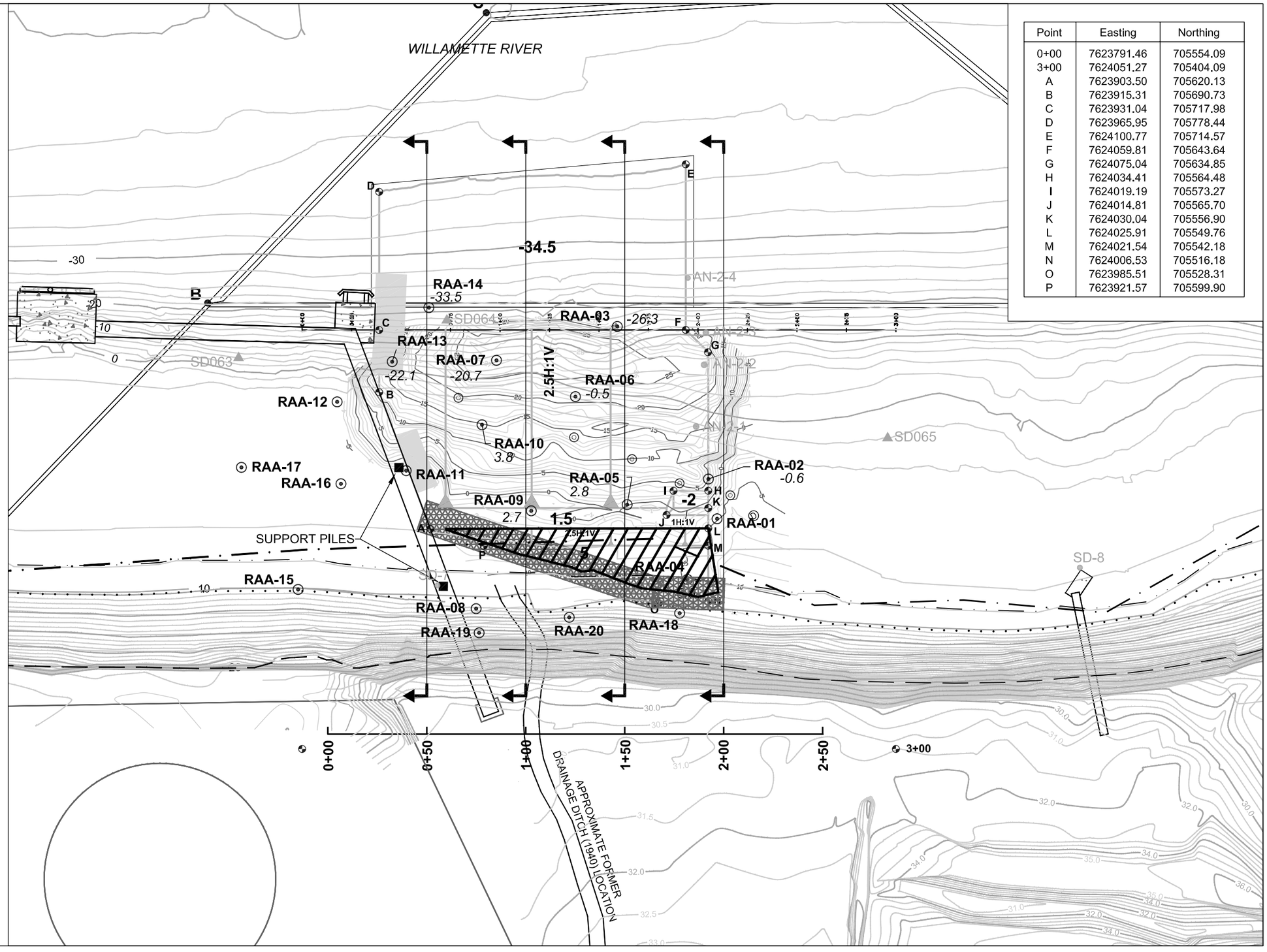

Figure 1
NW Natural Gasco Site
Reactive Geotextile Installation

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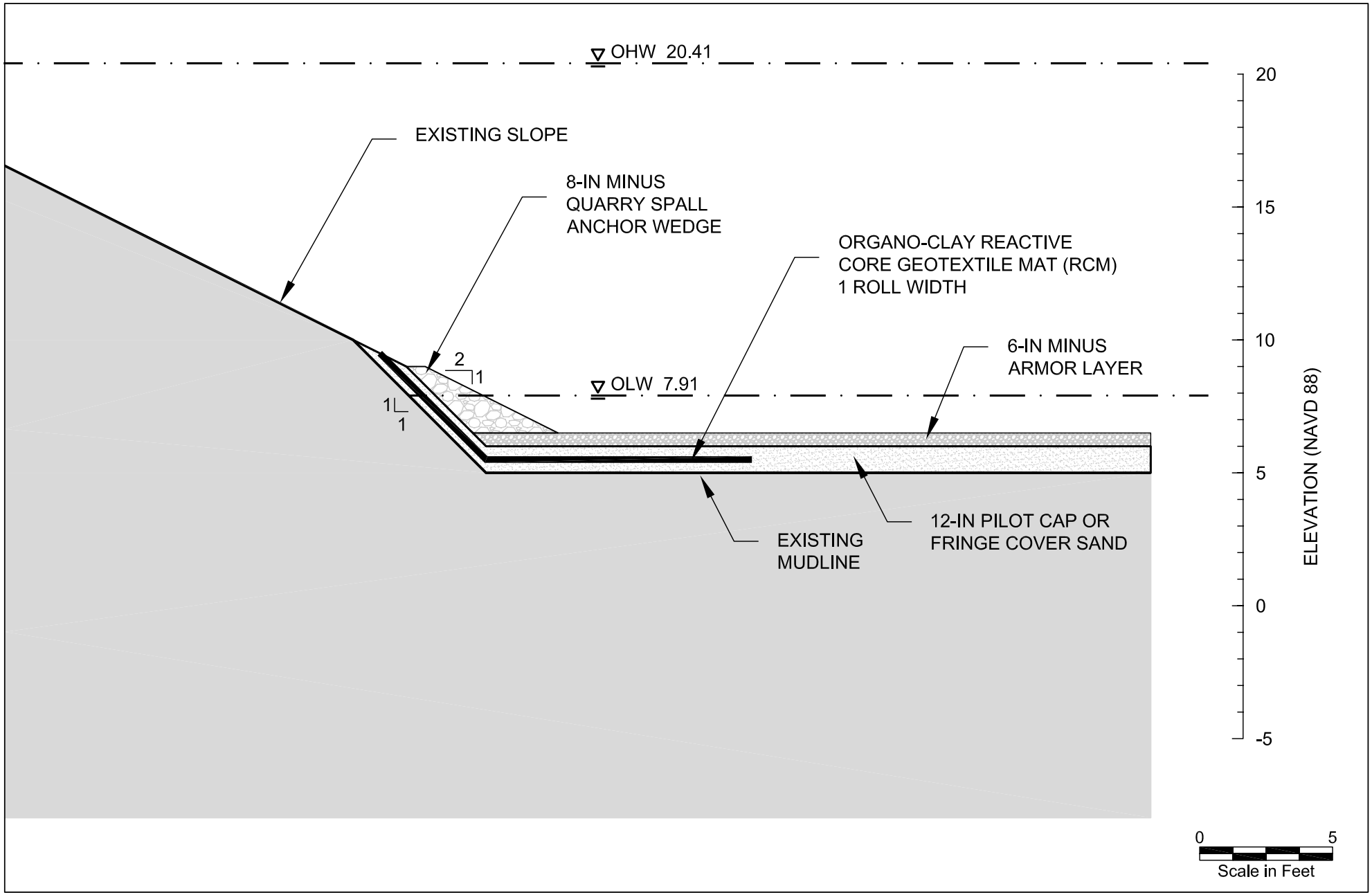

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Figure 2
NW Natural Gasco Site
Reactive Geotextile Section